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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,483	01/28/2004	K. Ranji Vaidyanathan	003248.00093	5060
22908	7590	10/26/2005	EXAMINER	
BANNER & WITCOFF, LTD. TEN SOUTH WACKER DRIVE SUITE 3000 CHICAGO, IL 60606			AFZALI, SARANG	
			ART UNIT	PAPER NUMBER
			3729	

DATE MAILED: 10/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SP

Office Action Summary	Application No. 10767,483	Applicant(s) VAIDYANATHAN ET AL.	
	Examiner Sarang Afzali	Art Unit 3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/3/05.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 15-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. <u>10242005</u> . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-14, drawn to method of making a heat exchanger, classified in class 29, subclass 890.03.
 - II. Claims 15-24, 26, drawn to a heat dissipating device, classified in class 174, subclass 16.3.
 - III. Claim 25, drawn to a method of determining optimal sizing characteristics of a heat exchanger, classified in class 703, subclass 2.

The inventions are distinct, each from the other because of the following reasons:

Inventions of Group I and Group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the device can be made without mechanically processing filaments to arrange the filaments in a predetermined orientation to provide a green body.

Inventions of Group I and Group III are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed

does not require the particulars of the subcombination as claimed because Group I does not require the detailed features stated in Group III such as applying a formula to determine optimal sizing characteristics of a heat exchanger for patentability. The subcombination has separate utility such as for use in a process that does not require a sintering step as recited in the combination.

Inventions of Group II and Group III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product could be made without the use of a formula.

During a telephone conversation with Jon Nelson on 10-17-2005 an election was made with traverse to prosecute the invention of Group I, claims 1-14. Affirmation of this election must be made by applicant in replying to this office action. Claims 15-26 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

2. Claim 10 is objected to because of the following informalities: Claim 10 is shown to be dependent on claim 8. However, it seems that this has to be corrected to show a dependency of claim 10 to claim 9.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. On line 2, the limitation "carbon additive" is unclear and vague as to what exactly the carbon additive is? Does it mean that there are special additives that contain carbon in them or there are certain types of carbon that can be used as additives?

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-2, 5-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Musso et al. (US 2003/0173720).

As applied to claim 1, Musso et al. teach a method for forming channeled articles used as heat sink for semiconductor devices wherein:

- (a) forming one or more filaments including first composition (cores 36 & 38, Fig. 5) enclosed in a second composition body (14, Fig. 5);
- (b) mechanically processing the filaments (36, 38, Fig. 5) to arrange them in a predetermined orientation to provide a green body (intermediate part 40, Fig. 5);
- (c) subjecting the green body to conditions effective for removing the first composition (cores 36 & 38) from intermediate body (40) and sintering the second composition (body 14, para. [0041], lines 1-7) to provide a heat exchanger wherein channels (12, Fig. 1) having walls made of the sintered second composition for containing coolant flow.

As applied to claim 2, Musso et al. further teach that filaments (core members) are mechanically processed by extruding them and depositing the filaments onto a working surface of in one or more layers (para. [0209], lines 1-3).

As applied to claim 5, Musso et al. teach that the first composition (core members) are thermally degradable composition and wherein the first composition is removed from the green body by heating it (para. [0219], lines 1-3).

As applied to claim 6, Musso et al. teach that the second composition (body 14) is metal and sinterable ceramics (para. [0090], lines 1-3 and Table 2).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Hoopman et al. (US 5,317,805). Musso et al. teach the invention cited with the exception of exclusively disclosing the limitations of using a solvent to remove first composition. However, it is well known in the art to provide different methods for removing a core used to form a cavity in a ceramic matrix composite where the core is removed by heating, leaching and solvents amongst other methods. Furthermore, Hoopman et al. teach a method of making microchannel heat exchangers utilizing sacrificial cores wherein a core in a unitary microchannel heat exchanger's shell is made around a sacrificial core (102) with microchannel forming portions (108) that comprise filaments and further these filaments are removed by being dissolved in a solvent (col. 18, lines 13-18) resulting in fabrication of complex geometries of heat exchanger design to effectively meet the cooling demands of almost any shaped component or other medium requiring a specific heat exchanger geometry (col. 4, lines 28-33). It would have been obvious to one ordinary skill in the art at the time of invention to have provided Musso et al. with a suitable core composition such as one taught by Hoopman et al. in order to provide an effective and suitable means of fabrication for complex geometries of heat exchanger design.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of and Hoopman et al. and Davenport (US 3,222,144). Musso et al. modified

by Hoopman et al. teach the invention cited with the exception of exclusively disclosing that the solvent used is water. It is well known in the art that the solvent used would depend on the chemical characteristics of the chemical targeted for removal, hence a water solvent is only indicative of the type of core material being used. Furthermore, Davenport teaches a manufacturing method of grid or honeycomb structures intended for use as heat exchangers (col. 6, lines 57-58) wherein a core (16) made of water soluble material can be dissolved in order to provide a self-supporting honeycomb structure within a shell or casing in a product in which the cellular passages are to be open (col. 4, lines 30-38, 45-48). It would have been obvious to one ordinary skill in the art at the time of invention to have further provided Musso et al./Hoopman with a suitable solvent such as one taught by Davenport in order to provide an effective and suitable means of removing the core material resulting in fabrication of self-supporting honeycomb structure within a shell.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Hanaki et al. (US 4,746,479). Musso et al. teach the invention cited with the exception of exclusively disclosing the limitation of silicon carbide. However, Hanaki et al. disclose a method of manufacturing a heat exchange element wherein the green body has a composition of silicon carbide used to form block type heat exchange elements which are heat resistive and have an improved property against thermal shock (col. 10, lines 32-38). It would have been obvious to one ordinary skill in the art at the time of invention to have provided Musso et al. with a suitable material such as one

taught by Hanaki et al. in order to provide an effective and suitable material for a heat exchange element.

11. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Avakian (US 2004/0106713).

As applied to claims 8-10, Musso et al. teach the invention cited with the exception of exclusively disclosing the use of a thermal conductivity enhancing material (claim 8), type of additive (claim 9) and weight percent (claim 10). However, Avakian teaches the use of additives in a thermoplastic compound wherein nanotubes of carbon is used as an example of thermal conductivity additive with a preferred range of 2 to 95 weight percent in order to enhance the existing manufacturing and use performance of the compound (Abstract, lines 1-12). It would have been obvious to one ordinary skill in the art at the time of invention to have modified Musso et al. with a suitable type and amount of additive material such as ones taught by Avakian to provide an effective means of further increasing the thermal conductivity of the heat exchange element.

12. Claims 8 and 9 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Ocher et al. (US 2003/0131476). Musso et al. teach the invention cited with the exception of exclusively disclosing the use of a thermal conductivity enhancing material (claim 8) and type of additive (claim 9) used. However, Ocher et al. disclose a heat-dissipating element wherein certain materials are adequately used in making radiator structures (101, Fig. 17), heat conduits (115, Fig.

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17) and heat reservoir (125, Fig. 17) for their high thermal conductivity characteristics such as silicon carbide (para. [0077], lines 1-10). It would have been obvious to one ordinary skill in the art at the time of invention to have modified Musso et al. with a suitable material such as one taught by Ocher et al. to provide an effective means of further increasing the thermal conductivity of the heat exchange element (col. 10, lines 43-51).

13. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Rainer et al. (US 5,533,258). Musso et al. teach the invention cited with the exception of exclusively disclosing the limitations of depositing a thin layer of material (claim 11) and CVD process (claim 12). However, Rainer et al. teach a process for the manufacturing a cooling unit wherein a coating of an intermediate thin layer with a thickness range of 10 to 50 μm is deposited by CVD (chemical vapor deposition) process is used to provide an excellent joint between the parts made of heat resistant material and the metallic coolant conduit (col. 2, lines 25-30). It would have been obvious to one ordinary skill in the art at the time of invention to have provided Musso et al. with deposition of a thin layer of material such as one taught by Rainer et al. to provide an effective means of part connection that would be capable of withstanding the high thermal stresses occurring during operation without the development of any significant damaging material cracks (col. 1, lines 60-67).

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14. Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of Rossi (US 2002/0037142). Musso et al. teach the invention cited with the exception of exclusively disclosing depositing a metallic layer. However, Rossi teaches a high thermal conductivity structure with a heat sink wherein the outer surface of the heat sink (18, Fig. 4) is nickel plated to provide improve weldability (para. [0060], lines 7-9). It would have been obvious to one ordinary skill in the art at the time of invention to have modified Musso et al. with a suitable metallic layer such as one taught by Rossi to provide an effective means of improved welding.

15. Claims 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Musso et al. in view of McCullough (US 6,093,961). Musso et al. teach the invention cited with the exception of exclusively disclosing the external protrusions. However, McCullough teaches a molded heat sink assembly wherein external protrusions (heat dissipating members (18), Fig. 2) is integrally formed to the base member (12, Fig. 2) and pointing upwardly into the air for optimum heat exchange from the base member (12, col. 4, lines 28-30). It would have been obvious to one ordinary skill in the art at the time of invention to have modified Musso et al. by forming suitable external protrusions such as ones taught by McCullough to provide an effective heat dissipating means.

Conclusion

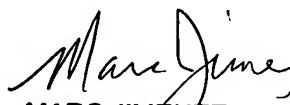
16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarang Afzali whose telephone number is 571-272-8412. The examiner can normally be reached on 7:00-3:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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10/24/2005


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10/25/05